

# The Relationship of Federal Flood Control and Drainage to the Agricultural Development of Wetlands in the Lower Mississippi Valley\*

A Case History: The Yazoo Basin, Mississippi

U.S. Fish and Wildlife Service  
Division of Ecological Services  
Vicksburg, Mississippi  
October 1986

\*A Background Report Prepared as Part of "The Impact of Federal Programs on Wetlands:  
A Report to Congress by the Secretary of the Interior, October 1988"

## Introduction

A recurring theme in the history of development of the Lower Mississippi Valley (the Delta) is the constraint to development imposed by flooding and poor drainage. Beginning with the passage of the various Swamp Lands Acts in 1849 and continuing through the establishment of the Mississippi River Commission in 1879 and the ongoing implementation of the Corps of Engineers flood control/drainage program, it has been acknowledged that development is neither possible, practical, nor sustainable in the absence of flood control/drainage projects (Galloway 1980). A relationship between flood control/drainage and agricultural development of the Delta's wetlands has long been recognized by credible observers. Harrison 1961 noted that "As flood control is essential to a permanent agriculture in the Alluvial Valley of the Lower Mississippi River, it is not surprising to find that there is a close relationship between the pattern of land clearing and agricultural settlement and extension of flood control programs or the hope for flood control." An understanding of this relationship must be predicated on an understanding of those characteristics that on one hand define the Delta's wetland nature and on the other define its impediments to agricultural development.

The purpose of this appendix is to provide that understanding and to in turn identify the flood control/drainage requisites of agricultural development in the Delta and the manner in which federal projects have met those requisites. From this relationship, the role of federal flood control/drainage in wetland conversion is defined and explained. Although the analysis is applicable to the Delta as a whole, its focus is a case history of a discrete sub-section, the Yazoo Delta, Mississippi. Consisting of a contiguous area of approximately 4.1 million acres, the Yazoo Delta comprises most of the State of Mississippi lying within the Delta and in a geographic sense could be considered the core of the Delta.

### The Wetland Character of the Delta and its Impediments to Agricultural Development

Three forces have combined to define both the wetland character of the Delta and its impediments to agriculture--flooding from the Mississippi River, flooding from alluvial valley tributaries (e.g. the Yazoo River) and the natural drainage characteristics of relatively flat alluvial soils subject to 50+inch average annual rainfall. Under natural conditions, all three could singularly or in combination either inundate or saturate the soil, producing conditions tolerable only to hydrophytic vegetation, i.e. the bottomland hardwood forest ecosystem endemic to the region. Thus some control must be exerted on all three forces if agricultural development of the Delta is to be sustainable or permanent.

The dominating influence that Mississippi River flooding historically exerted is often overlooked, in that the mainstem flood control system has not been breached since 1937. Figure 1, however, can provide some insight as to the frequency and extent of

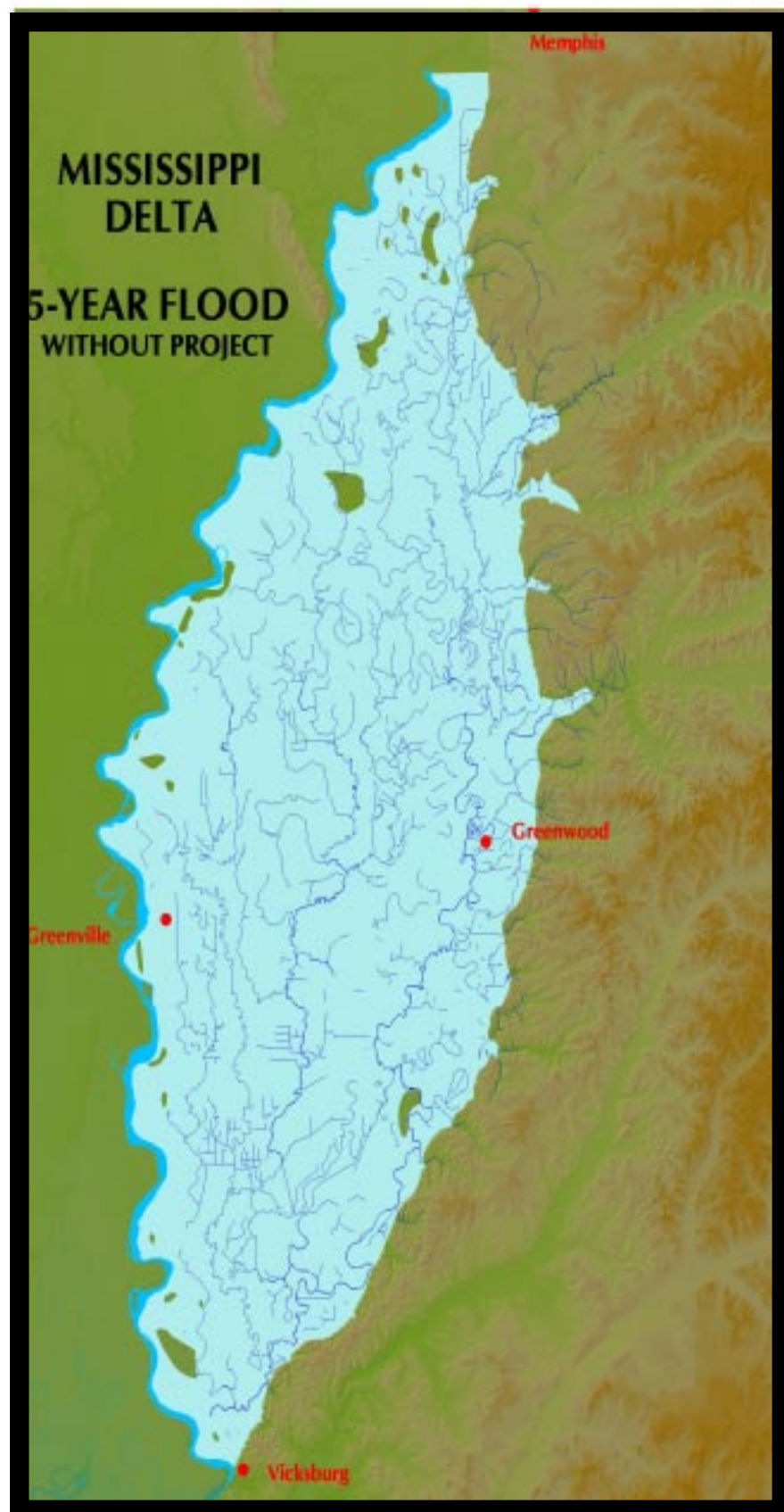


Figure 1: Area Inundated by the 5-Year Flood  
Assuming No Federal Flood Control/Drainage  
(Adapted from Galloway, 1980)

inundation. Adapted from Galloway 1980, Figure 1 depicts the extent of inundation of the Yazoo Delta that would result from only a five year frequency flood on the Mississippi River assuming no mainstem flood control works in place. Approximately 97 percent (4 million acres) of the Yazoo Delta would be inundated under such conditions. A two-year frequency flood would inundate approximately 95 percent. This latter statistic is particularly relevant to the issue of agricultural development in wetlands from both technical and policy standpoints. Technically, the soils associated with such areas would meet the criteria for hydric (wetland) soils established by USDA and would not meet USDA technical criteria for prime farmland. Thus under current policies and legislation, such areas would be viewed as wetlands under the "swampbuster" provisions of the Food Security Act of 1985 and not as prime farmland.

The influence of tributary flooding in the Yazoo Delta can be discerned from Figure 2. Again adapted from Galloway 1980, Figure 2 depicts the extent of inundation in the Yazoo Delta from a five-year frequency flood assuming mainstem flood control works in place but no tributary flood control having been provided. Under such conditions, tributary flooding would inundate approximately 39 percent (1.6 million acres) of the Yazoo Delta. Thus a comparison of Figures 1 and 2 gives an indication of the relative influence of Mississippi River flooding and tributary flooding. The phenomenon underlying the contrast between the two figures is that if Mississippi River overflow can be controlled, otherwise subtle variations in topography became significant in terms of susceptibility to tributary flooding.

The effect of natural drainage characteristics on agriculture development of Delta wetlands is as pervasive as that of Mississippi River overflow, though not nearly as dramatic. Adapted from a USDA map of "Mississippi Forestland and Soil Associations", Figure 3 depicts that portion of the Yazoo Delta consisting of soil associations of "dominantly wet soils." Recognizing that within these soil associations there are variations in topography that can produce significant variations in drainage characteristics, the "dominantly wet soils" are nonetheless described as "poorly drained" to "somewhat poorly drained." The impediments to agriculture associated with such descriptors are apparent from the following Soil Conservation Service definitions:

Somewhat Poorly Drained -- Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided.

Poorly Drained -- Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained.

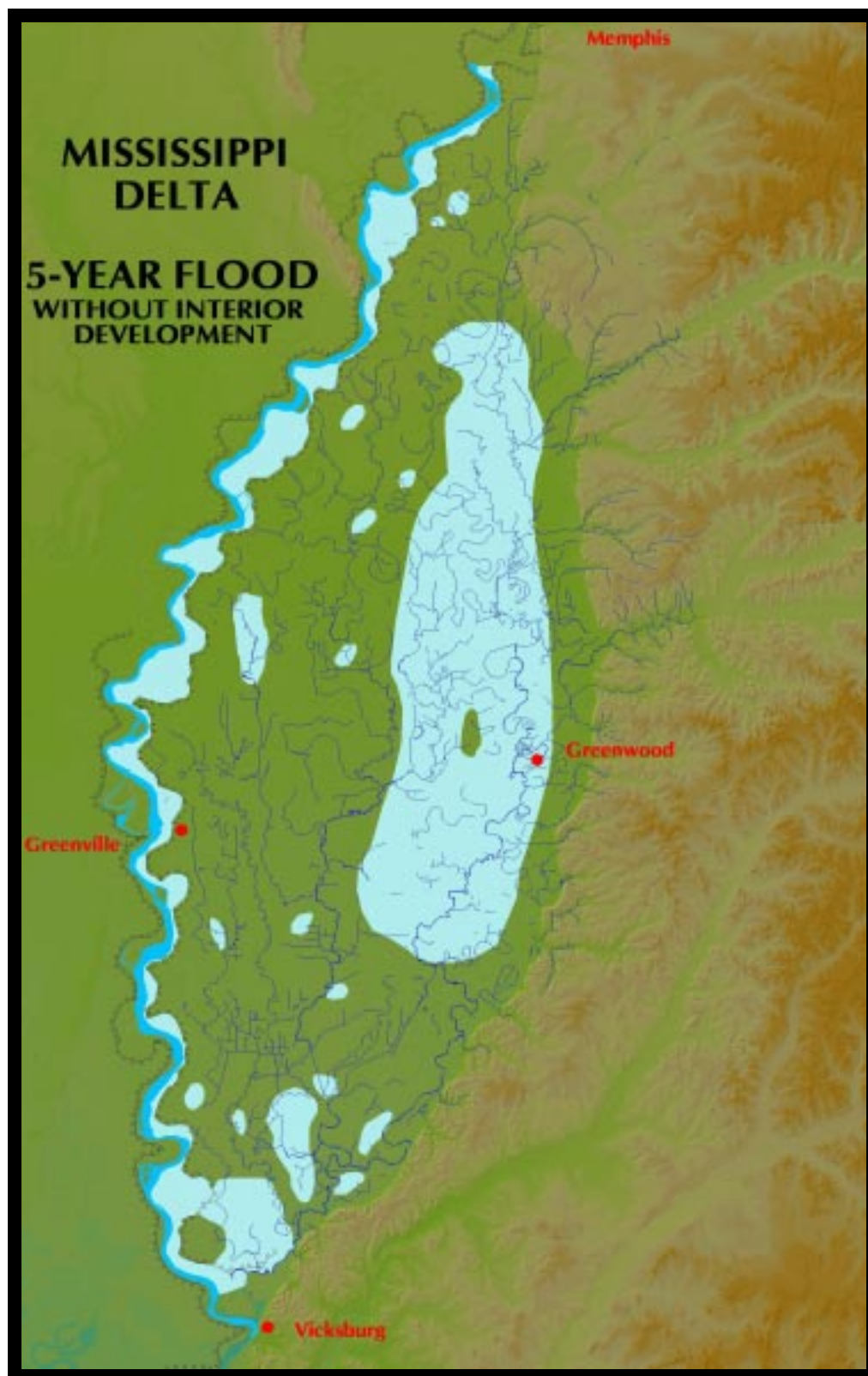


Figure 2: Area Inundated by the 5-Year Flood  
Assuming Construction of the Mainstem Levee and  
No Interior Development (Adapted from Galloway, 1980)



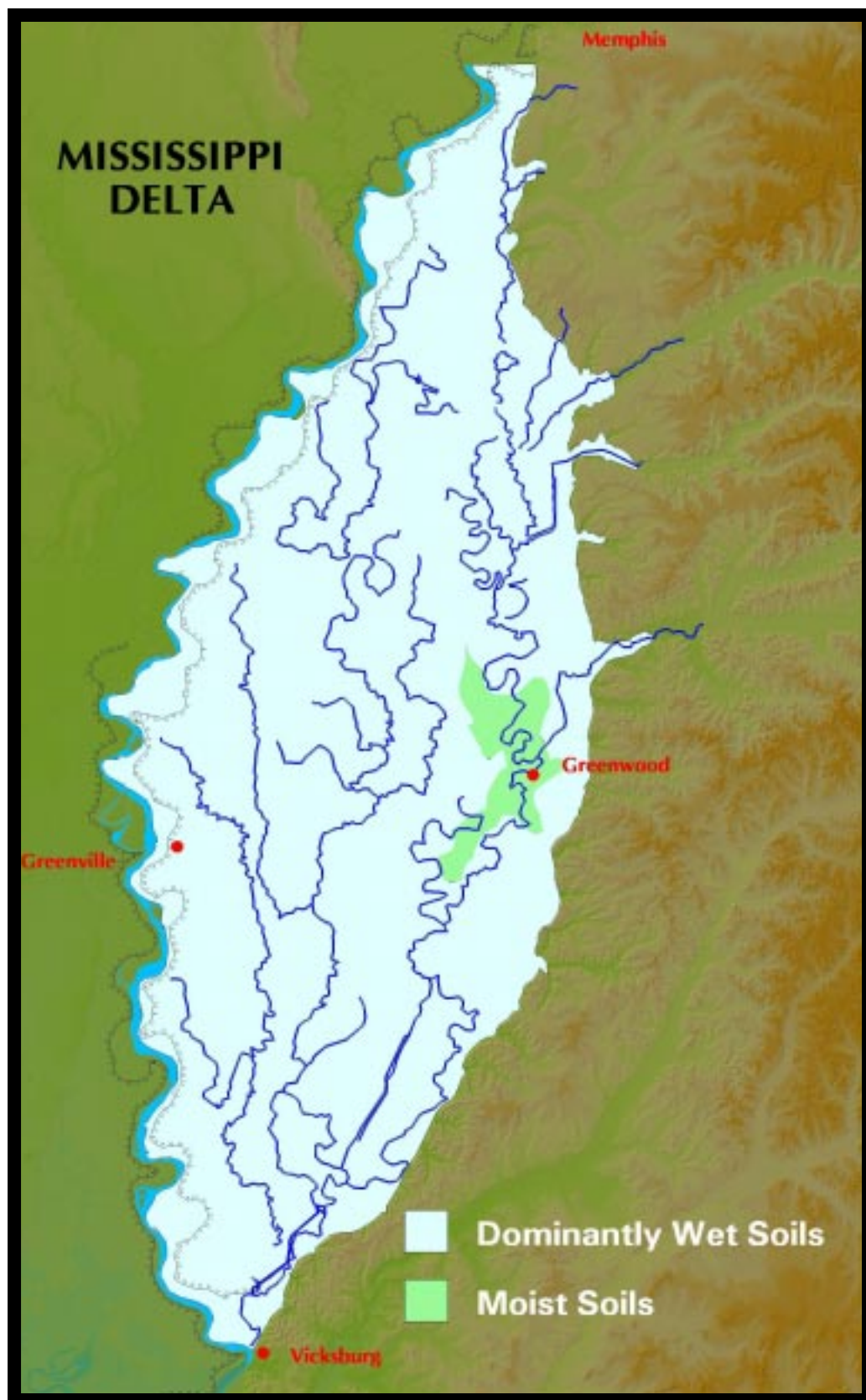


Figure 3. "Dominantly Wet Soils" of the Yazoo Delta  
(Adapted from "Mississippi Forestland  
and Soil Associations," USDA, 1975)

### The Flood Control/Drainage Requisites of Agricultural Development in the Delta

A comparison of Figures 1, 2, and 3 would indicate that practically all of the Yazoo Delta was subject to at least two of the three major factors accounting for the Delta's wetland nature and that a significant portion was subject to all three. It should be apparent then that the flood control/drainage requisites of agricultural development in the Delta as a whole are three-fold:

1. Protection from Mississippi River flooding;
2. Protection from tributary flooding; and
3. Improved drainage.

The first requisite must be viewed in a context that goes beyond agricultural crop damage. Control of the frequent and extensive flooding of the Mississippi River was and is a requisite to settlement of the Delta. The flooding conditions depicted in Figure 1 are incompatible with the infrastructure of long-term development of practically any purpose on any scale. Tributary flooding on the other hand does not pose the threat to community infrastructure associated with Mississippi River flooding. Control of the latter allows development to exist and as indicated earlier, makes otherwise subtle variations in the seemingly flat topography of paramount importance. The extent of tributary flood control and drainage will then dictate the ultimate extent of agricultural conversion of wetlands.

A requisite for drainage generally exists at three levels: improvement of primary and secondary tributaries; improvements to tertiary tributaries and/or construction of lateral drainages; and on-farm drainage improvements. Thus the drainage of any particular farm in the Yazoo Delta would typically consist of on-farm drainage ditches connecting to lateral ditches (those common to two or more farms) connecting to a network of channel improvements on tertiary, secondary, and primary streams. The complexity of the drainage system is such that drainage projects on tertiary systems may be delayed a period of years pending completion of a secondary system, and/or secondary and primary systems may become hydrologically less effective (necessitating additional improvements) as additional wetlands are cleared and their drainage systems connected to the original drainage project.

### The Function of Federal Flood Control/Drainage in Meeting the Requisites of Agricultural Development

The primary responsibility for both flood control and drainage in the Delta has been assumed by the Federal Government and has been exercised largely through the civil works program of the Corps of Engineers and on a much smaller scale through the P.L.566 Small Watershed Program of the SCS. Protection from Mississippi River flooding is the function of the Mainstem Feature of the Corps' Mississippi River and Tributaries (MR&T) Project. This feature consists primarily of the mainstem levee

and channel improvements. The extensive tributary flood control and drainage system is mostly a product of the Tributary Features of the MR&T Project. The P.L. 566 drainage program is restricted largely to tertiary, lateral, and on-farm drainage systems in select watersheds. Technical assistance for on-farm drainage has also been provided by SCS through various technical service programs.

### The Role of Federal Flood Control/Drainage in the Wetland Conversion Process

Having considered the flood control/drainage requisites of agricultural development of the Delta's wetlands and the function of federal programs in meeting those requisites, it is appropriate now to address roles--to consider the role of federal flood control/drainage in the process of wetland conversion and in so doing define more precisely the relationship between federal projects and the disappearance of the Delta's wetlands.

The process of converting the Delta's forested wetlands to agriculture has often been equated to those activities associated with the initial clearing and readying of the land for row crop tillage. This, however, is only half the process. The clearing of a forested wetland does not of itself eliminate the hydrologic conditions responsible for the area being a wetland; and unless such clearing is preceded or followed by flood control/drainage, the long-term viability of the non-wetland land use is tenuous. Simply stated, the role of the federal flood control/drainage program has been to provide the hydrologic modifications that are requisite to agricultural development of the Delta's wetlands. However, in that this basic role may be exerted in either of two distinct situations, it is appropriate for purposes of clarification to speak of two roles.

Role 1: Federal flood control/drainage preceeds clearing and causes or induces the clearing and conversion of wetlands by increasing their suitability for agricultural production.

Role 2: In instances where the initial clearing is stimulated by other factors, federal flood control /drainage provides the hydrologic modifications that reduce flood damages and intensify yields and thereby allows the initial encroachment to be sustained as an economically viable long-term land use.

Thus the relationship between the two roles is a function of what comes first--the clearing or the hydrologic modification. The logical order is for flood control/drainage to come first and provide the hydrologic inducement to clearing and conversion. In such situations Role 1 is at play; however, history has shown that the order is at times reversed. Harrison 1961 noted that "... in the history of land development throughout the Alluvial Valley of the Mississippi, there are many cases of clearing in areas in which needed drainage works have not been established. The clearing and attempted development of undrained land has been the cause of much hardship and financial loss throughout the Mississippi River lowlands." Thus clearing has often come first and been attended by the crop damages inherent in farming a wetland.



Federal projects then provide, through Role 2, the hydrologic modifications necessary to sustain that clearing. In either Role, the final outcome is the same--the hydrologic characteristics that on one hand define the wetland and on the other impede agricultural conversion are eliminated.

The relationship between the two roles described above and the extent to which each has affected wetland conversion is typified by the development of the 4.1 million-acre Yazoo Delta. Information presented in the following discussion is derived largely from two reports, both of which are Corps of Engineers documents. The first is the MR&T Comprehensive Review Report (Annexes L, M, and Q), and the second is the Ex-Post Evaluation of Regional Water Resources Development: The Case of the Yazoo-Mississippi Delta. The former report was prepared by the Corps in 1959 as the first and only comprehensive review of the MR&T project. The latter report (cited earlier as Galloway 1980), was authored by Col. Gerald E. Galloway, Jr., former District Engineer for the Vicksburg District Corps of Engineers. The report compared actual conditions in the Yazoo Delta against conditions that would have occurred under two alternate scenarios of Corps flood control/drainage. The first scenario assumed no flood control/drainage by the Corps. The second assumed that the Corps had constructed and maintained the mainstem flood control features but that all flood control/drainage on the alluvial tributaries (interior development) had been left to non-federal interests. Col. Galloway's projections were predicated on the hydrologic conditions that would have existed with each scenario.

Figure 1 depicts the hydrologic conditions associated with the first scenario. This scenario assumed that following the flood of record in 1927, the Federal Government had declined to assume the responsibility for mainstem flood control, that the Flood Control Act of 1928 had not passed, and thus that the Corps had not constructed what are now the Mainstem Features of the MR&T Project. The underlying assumption was that state and local governments would have been financially unable to assume this responsibility. Under this scenario, Galloway projected that approximately 2.1 million acres of land that was cleared at the time of the 1927 flood would have ultimately reverted to floodplain forest. Approximately 1.8 million acres would have remained in a forested land use. In total, approximately 3.9 million acres or 95 percent of the Yazoo Delta would have been floodplain forest, almost all of which would be wetlands.

By comparison, Figure 2 depicts the area inundated by the five-year frequency flood under the more plausible scenario of Corps construction and maintenance of the Mainstem Features but no Federal involvement in tributary development. Again, the underlying assumption is that state and local governments would have been financially unable to construct and maintain the extensive interior flood control system now being implemented as the Tributary Features of the MR&T Project. With this scenario, Col. Galloway projected that the acreage of cleared land would increase slightly to 2.2 million acres and that approximately 1.7 million acres would remain in floodplain forest.

A comparison of the two scenarios would attribute the conversion of approximately 2.2 million acres of forested wetlands in the Yazoo Delta to the construction of the Mainstem Features of the MR&T Project. Only about 100,000 acres would be attributable to induced clearing (Role 1); whereas 2.1 million acres of the conversion would be attributable to hydrologic modifications that sustained and intensified a non-wetland land use in what would otherwise be a wetland (Role 2).

It is neither practical nor plausible to consider alternative policies regarding the existing Mainstem Features. The system is essentially complete, and its continued maintenance is critical to the protection of the LMV from catastrophic flooding. Tributary development on the other hand is not complete and for the most part invokes issues pertinent to the continued expansion and intensification of agriculture in wetlands rather than to the protection of human life. The relationship between wetland conversion and the Corps flood control/drainage program for tributary development therefore merits closer inspection.

As indicated previously, under the scenario of no tributary development, approximately 1.7 million acres of floodplain forest would exist. The forested areas would generally coincide with the extent of the 5-year frequency flood as depicted in Figure 2. However, subsequent to the passage of the Flood Control Act of 1936, the Corps has been engaged in an intensive and expansive program of interior flood control and drainage in the Yazoo Basin that is for the most part targeted at the flood-prone areas depicted in Figure 2. According to Galloway, "Following action by Congress in the late thirties and early forties, construction [by the Corps] of major internal improvements began and continues today. These works permitted conversion of thousands of acres of formerly marginal woodlands and swamps into agriculture". The plan for interior development consists of approximately 85 individual projects pursued under three broad project categories--the Yazoo Headwater Project, the Yazoo Backwater Project, and the Big Sunflower River Project. The relationship between these three projects and the areas of tributary flooding is depicted in Figure 4. As of 1983 the total Federal expenditures for the three projects was \$643,781,016 (Corps of Engineers 1983); whereas the total Federal first cost to complete the authorized features is projected to be \$1.4 billion. (Miss. River Comm. 1985).

The acreage of floodplain forest estimated to occur in the Yazoo Delta as of 1985 is 0.7 million. (McDonald et. al. 1979). The 1.0 million-acre difference between this figure and the acreage projected by Col. Galloway in the absence of tributary development is the wetland conversion attributable to tributary development to date. The relative extent that the two roles have played in this 1.0 million acres of wetland conversion can be discerned from information contained within the MR&T Comprehensive Review Report.

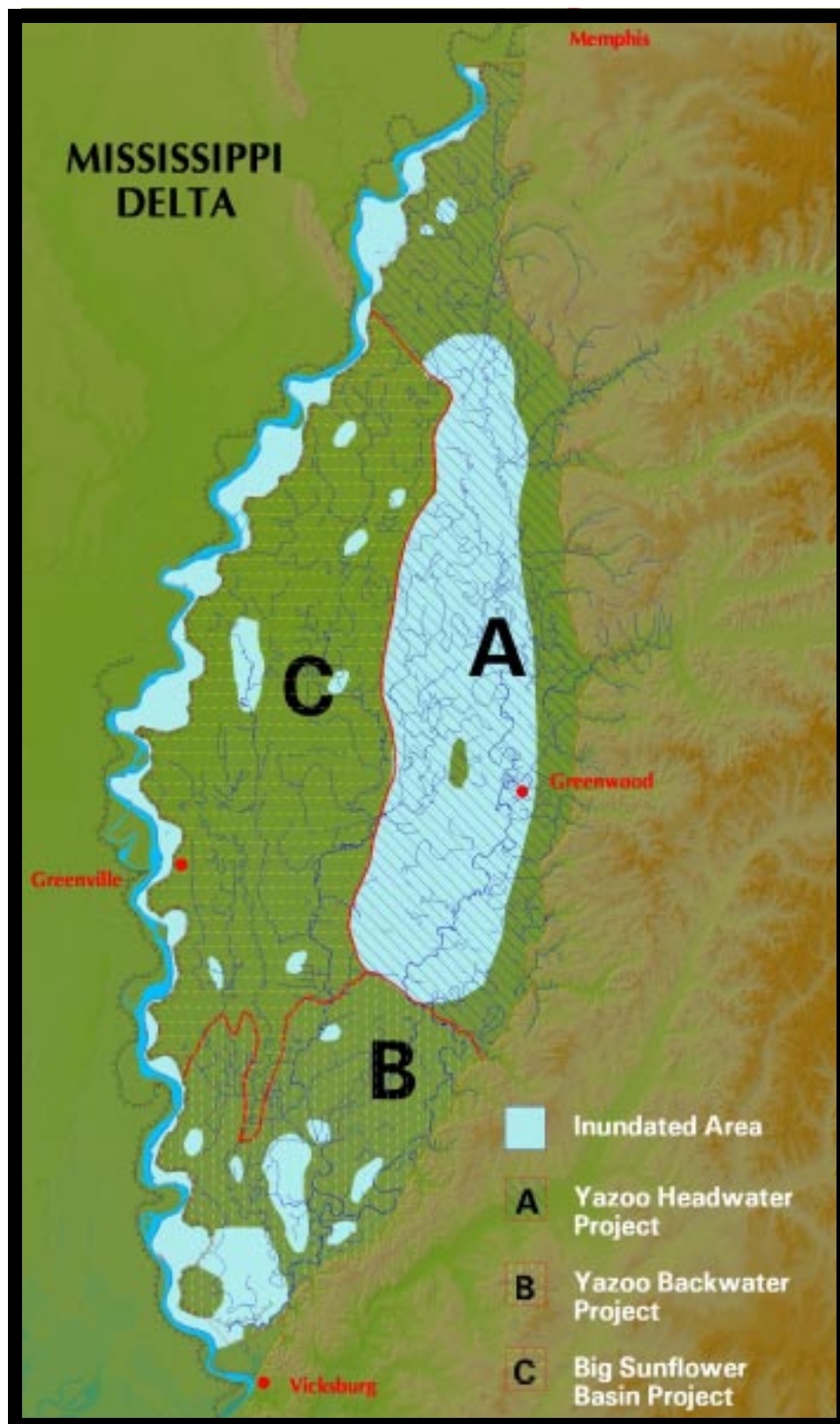


Figure 4: Relationship Between the Three Major COE Interior Flood Control/Drainage Projects and Interior Flooding (Adapted from Galloway, 1980)

Table 1 profiles the land use and projected clearing in the area of primary benefit for each of the three major Tributary Features as analyzed and proposed in the 1959 report. The system of tributary development was targeted at an area that contained 1,276,000 acres of floodplain forest. The benefit/cost analysis was in turn predicated on the projected clearing of 822,000 acres (64 percent). 695,000 acres was considered project-induced clearing and 127,000 acres was projected to occur without the project. (It is pertinent to note, however, that 114,000 acres of this latter clearing was identified as having “been brought about by prior works of improvement such as channel realignment and improvement, levees, the construction of reservoirs, etc.”<sup>1</sup>). Thus the effect of Role 1 in tributary development was the project-induced clearing of approximately 820,000 acres of forested wetlands. The effect of project-induced clearing on the economic justification of projects is exemplified by the fact that 47 percent of the Yazoo Headwater Project’s benefits were attributable to induced clearing and in the absence of such benefits, the B/C ratio would have been 0.6.

The degree of wetland conversion associated with Role 2 would be a function of the extent to which the 766,000 acres of previous clearing could be sustained as a permanent, economically viable land use in the absence of Federal flood control/drainage. Much of this area lies within the 5-year frequency flood event as depicted in Figure 2, and on the basis of Col. Galloway’s projection, would be floodplain forest in the absence of tributary development. Such a projection is corroborated by the natural drainage characteristics of the area as described in the MR&T Comprehensive Review Report. The following soil description of the area of primary benefit for the Yazoo Backwater Project typified the prevalent drainage conditions:

“It is a very slowly permeable, poorly drained soil on level to nearly level slopes. It occupies a lowland position between the natural levees and the major streams traversing the project. Natural surface drainage is very slow. This soil is very difficult to manage; when wet it is very plastic, and when dry is subject to severe cracking which is injurious to roots of certain plants. The inherent fertility of the soil is high; however, high yields of adapted crops is dependent upon excellent surface drainage and moderately dry years” (emphasis added).

Thus from the analysis of the MR&T Comprehensive Review Report and the projections of Galloway 1980, the following conclusions can be drawn regarding the effect of Federal flood control/drainage on wetland conversion in the Yazoo Delta:

1. The conversion of approximately 2.2 million acres or 54 percent of the Yazoo Delta’s forested wetlands is attributable to the Mainstem Features of the MR&T Project.
2. The conversion of approximately 1.5 million acres or 37 percent of the Yazoo Delta’s forested wetlands is attributable to the Tributary Features of the MR&T Project.

---

<sup>1</sup> Appendix VII, Annex L, P.4; MR&T Comprehensive Review Report.

Table 1  
Land Use and Projected Clearing in the  
Area of Primary Benefit for Interior Development  
of the Yazoo Delta<sup>2</sup>

Project	Area of Primary Benefit			W/O Project Clearing	W/Project Clearing
	Cleared	Wooded	Total		
Yazoo Headwater	450,000	750,000	1,200,000 <sup>3</sup>	-----	548,000 <sup>2</sup>
Yazoo Backwater	204,000	412,000	616,000 <sup>4</sup>	114,000 <sup>5</sup>	106,000 <sup>4</sup>
Big Sunflower	112,000	114,000	226,000 <sup>6</sup>	13,000 <sup>7</sup>	41,000 <sup>6</sup>

<sup>1</sup> All references are to the 1959 Mississippi River and Tributaries Comprehensive Review Report, Corps of Engineers.

<sup>2</sup> Appendix III, Annex Q, pp. 2-3

<sup>3</sup> Acreage in Soil Mapping Unit 1, Table 1, Appendix VII, Annex L

<sup>4</sup> Appendix VII, Annex L, p.4

<sup>5</sup> Acreage in Soil Mapping Unit 1, Table 1 for Areas 1-6, Appendix VII, Annex M

<sup>6</sup> Appendix VII, pp. 8 & 28, Annex M

3. Whereas Mainstem Features had the primary effect of sustaining (through catastrophic flood protection) pre-project settlement, Tributary Features have operated in the Yazoo Delta as a Federal program for the expansion and intensification of agriculture in forested wetlands.

An Analysis of Key Policies  
Guiding the Implementation  
Of the Federal Flood Control/Drainage Program

The two-fold role of the Federal flood control/drainage program in the conversion of the Delta's wetlands has been and remains a function of the policies guiding that role. Any consideration of modifying the role in the interest of wetland conservation must therefore be made in the context of those policies. The following discussion will thus provide a brief analysis of flood control/drainage policies as they relate to wetland conversion. For the sake of specificity, the focus will be on the MR&T Project.

The shape and substance of the MR&T Project (to include its impact on wetlands) is a product of four basic policies:

1. Protection of the Delta from catastrophic flooding;
2. Agricultural expansion through project-induced conversion of forested wetlands (Role 1);
3. Agricultural intensification through the provision of flood control/drainage to cleared wetlands (Role 2); and
4. A Federal assumption of responsibility for nearly all costs of construction, operation, and maintenance.<sup>8</sup>

The first policy was essential to settlement and development of the Delta to any significant degree; and as indicated previously, it is critical to maintaining existing development. It is a statement of Federal responsibility to the protection of the Delta from Mississippi River flooding. As the analysis of the Yazoo Delta has indicated, providing that protection had significant consequences to the ultimate extent of wetlands. It is, however, the second and third policies that have had the effect of creating in the form of the Tributary Features of the MR&T Project a major federal program for agricultural expansion and intensification in forested wetlands. The fourth policy has acted to define the financial obligation of the Federal Government in carrying out that program.

Given the interrelationship that exists between flood control/drainage policies and the agricultural conversion of wetlands, it would be logical to assume that such policies would emanate from a larger policy framework involving coordination with national

---

<sup>2</sup> Largely as a Depression-era response, the Flood Control Act of 1938 eliminated most cost-sharing requirements. The recently passed Water Resource Development Act of 1986 will increase the non-federal cost share on some projects.



agricultural policies and wetland conservation policies. Such has not been the case, however; and the success of the Federal flood control/drainage program has raised questions as to the ultimate extent of wetland conversion.

To what extent should the Delta be developed for agriculture? What balance, if any, should exist within the Federal program between agricultural development, maintenance of forested land uses, and wetland conservation? What is the relationship between flood control/drainage policies and national agricultural policies? Should Federal flood control/drainage be extended to all areas or should some areas be retained for flood plain/wetland land uses. The answers to such questions would serve as a guide to the implementation of the Nation's largest flood control/drainage program. Although these and similar questions have been raised previously, they have not been addressed in the context of the MR&T Project. Col. Galloway's analysis of the Corps program in the Yazoo Delta "did not address the issue of the best use of land in the Delta. . . The Delta's substantial contribution to a favorable balance of payments for the nation apparently has decided that question by default." In this sense, a lack of answers has guided program implementation. Accordingly, the Tributary Features of the MR&T Project have been implemented as a series of otherwise individual engineering projects that have encouraged and largely sustained agricultural expansion into the Nation's largest forested wetland complex without broad policy planning and oversight as to the long-term implications to either agriculture or wetlands.

The implications of unreconciled policies extend not only to wetland conservation but to agriculture and flood control. A significant consequence has been agricultural expansion into progressively more marginal areas. According to the SCS 1982 National Resource Inventory, approximately 800,000 acres of cropland within the Yazoo Delta occurs in the more marginal capability classes of IVw - VIIw, where wetness poses "very severe limitations" to use. The implication to wetlands is the replacement of increasingly scarce resources with high risk agricultural land. The implication to agriculture is increased production on marginal areas in the face of specific initiatives (Title XII of Food Security Act of 1985) aimed at discouraging production on marginal lands to include wetlands. In terms of Federal participation in flood control/drainage, the consequences of continued encroachment are manifested in increasing demands for additional flood protection/drainage and the implementation of federal projects targeted at progressively wetter areas. A specific example from the Yazoo Delta will suffice to indicate that federal projects have both led and followed agriculture into progressively more marginal areas.

The example is the Yazoo Area Pumps Project. Originally authorized in 1941, the project was designed to function with a natural sump storage area consisting of approximately 135,000 acres of forested wetlands. The assumption by the Corps, as stated in House Document 359, was that this very flood prone area would not be developed for agriculture and "To deny flood protection to the forested lands below 90 feet msl [the sump storage area] would leave unimpaired their values and use as

timberland.” Accordingly, during the 1959 MR&T Comprehensive Review Report, the Corps re-analyzed the pump project only as a means of providing protection above the natural sump storage area. The Corps concluded that the hydrologic benefits of other projects being implemented made it “feasible to develop a simplification of the authorized plan by eliminating pumping at a large saving in project cost.” However, in response to a gradual encroachment of agriculture into the sump during the 1960’s and 70’s, the project was reevaluated. Providing flood protection and drainage to the sump was a major focus, and in 1982 the project was recommended for construction at a federal first cost of \$179 million. As reevaluated, approximately 79 percent of project benefits accrued not to flood damage reduction but rather to agricultural expansion and intensification within the sump to include the projected clearing of an additional 30,000 acres of forested wetlands.

A comparison of the Corps recommendation of 1959 to that of 1982 would indicate that past agricultural expansion into a 135,000-acre natural sump storage area necessitates a significant federal expenditure the economic justification of which is predicated on the agricultural conversion of an additional 30,000 acres of forested wetlands. Thus the Yazoo Area Pumps Project exemplifies federal projects that respond to agricultural encroachment in areas where the extension of flood control/drainage was not envisioned and in the process create the hydrologic inducements for further conversion of wetlands to agriculture.

### Conclusions

Three forces have combined to define the wetland nature of the Delta and its corresponding impediments to agricultural development. These three forces are flooding from the Mississippi River, flooding from the alluvial valley tributaries, and the naturally poor drainage characteristics of relatively flat alluvial soils subject to 50+ inch average annual rainfall. The Federal flood control/drainage program has operated to provide the hydrologic modifications that are requisite to agricultural development under such conditions. The Mainstem Features of the MR&T Project have controlled Mississippi River flooding. Extensive conversion of wetlands (as much as 50+ percent in the Yazoo Delta) was an unavoidable by-product, although the impact occurred largely as a result of sustaining pre-project settlement. The Tributary Features of the MR&T Project (and to a much smaller extent the P.L. 566 program) have on the other hand functioned as a major federal program for agricultural expansion and intensification in forested wetlands. A general lack of coordination between flood control policies, agricultural policies, and wetland conservation policies has led to the conversion of increasingly scarce wetlands to what is often marginal, high-risk cropland; increasing demands for additional flood control/drainage; and the implementation of federal projects targeted at progressively wetter areas.